

In re Patent Application of:
BRANCIFORTE ET AL.
Serial No. 10/701,160
Filing Date: NOVEMBER 4, 2003

REMARKS

Applicants would like to thank the Examiner for the thorough examination of the present application. Applicants would also like to thank the Examiner for the courtesies extended during the telephone interview on September 26, 2007.

As suggested by the Examiner, independent Claims 14 and 27 have been amended so that they are more clearly directed to a practical application to overcome the rejection under 35 U.S.C. §101. In particular, the independent claims recite that Grover's quantum algorithm is for searching elements in a database, and that the output vectors from the interference subsystem represents the elements searched in the database. In addition, the independent claims have been amended to recite that a processing device implements the quantum gate for running Grover's quantum algorithm for searching the elements in the database.

The processing device is best illustrated in FIGS. 3 and 8. The entanglement subsystem is represented by section I-a in FIG. 3 for performing an entanglement operation on components [011, ..., 082] of the linear superposition vectors for generating components of entanglement vectors. The interference subsystem performs an interference operation on components of the entanglement vectors for generating components of output vectors.

The interference subsystem comprises at least one adder [HB25] receiving as input signals representative of even or odd components of an entanglement vector [Q1, ..., Q8], and generating a sum signal [SQ] representative of a weighted sum with a scale

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factor of the even or odd components. The interference subsystem further comprises an array of adders [**HB16, ..., HB23**], each receiving as input a respective signal representing an even or odd component of an entanglement vector [**Q1, ..., Q8**] and the sum signal [**SQ**], and generating as a difference between the sum signal [**SQ**] and a signal representing an even or odd component of an entanglement vector [**Q1, ..., Q8**] a signal representing an even or odd component of the output vector [**A1, ..., A8**].

An advantage of the processing device is that the interference operation of the Grover's algorithm is performed in a very fast manner by using an adder so that it is input with signals representing even or odd components of an entanglement vector. The sum signal is generated representing a weighted sum with a scale factor of the even or odd components. As a result of the array of adders, with each being input with a respective signal representative of an even or odd component of an entanglement vector, and with the weighted sum signal, a signal representative of an even or odd component of an output vector is generated as the difference between the weighted sum signal and the signal representing an even or odd component of an entanglement vector, with the output vector representing the elements searched in the database.

The Applicants submit that the amended claims overcome the rejection under 35 U.S.C. §101. To advance prosecution of the present case, Claims 31-32 are being cancelled.

In view of the amendments to the claims and the remarks provided herein, it is submitted that Claims 14-30 are

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patentable. Accordingly, a Notice of Allowance is requested in due course. Should any minor informalities need to be addressed, the Examiner is encouraged to contact the undersigned attorney at the telephone number listed below.

Respectfully submitted,


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